CLAIMS

We claim:

1. An automatic gain control system comprising:

an automatic gain control core circuit adapted to apply a gain to an input signal to provide an output signal;

a power detector circuit adapted to receive the output signal and provide a first signal which indicates a power level of the output signal; and

a processor adapted to control the gain of the automatic gain control core circuit based on the first signal.

2. The system of Claim 1, further comprising an analog-to-digital converter adapted to receive the first signal from the power detector circuit and provide the first signal as a digital signal to the processor.

3. The system of Claim 1, wherein the processor provides a calibration signal to the power detector circuit to calibrate a reference level for the system.

4. The system of Claim 3, further comprising a digital-to-analog converter adapted to receive the calibration signal and provide the calibration signal as an analog signal to the power detector circuit.

5. The system of Claim 3, further comprising:

a first switch, coupled between the processor and the power detector circuit, adapted to be closed by the processor during a calibration mode of the system to calibrate the reference level; and

a second switch, coupled between the automatic gain control circuit and the power detector circuit, adapted to be closed by the processor during a continuous automatic gain control mode of the system.

6. The system of Claim 1, wherein the power detector circuit comprises:

a correlator; and

a low pass filter coupled to the correlator to determine the power level of the output signal.

7. The system of Claim 1, wherein the processor provides a coarse gain control signal and a fine gain control signal to the automatic gain control core circuit to control the gain.

8. The system of Claim 7, wherein the automatic gain control core circuit comprises a plurality of gain stages, with each of the gain stages having a plurality of transconductance stages.

9. The system of Claim 8, wherein the fine gain control signal controls a bias current value for the transconductance stages, and the coarse gain control signal selects which of the transconductance stages contribute to the gain.

10. The system of Claim 8, wherein the plurality of transconductance stages for each gain stage is associated with at least one load impedance.

11. The system of Claim 10, wherein the load impedance comprises a shunt, a shunt-series, a series-shunt, a series-shunt-series, a T-coil, a T-coil with a cross-coupled capacitor, or a series-T-coil.

12. An automatic gain control circuit comprising:

an amplifier adapted to apply a gain to an input signal to provide an output signal;

a detector adapted to receive the output signal and provide a first signal based on the output signal; and

a processor adapted to provide a coarse gain control signal and a fine gain control signal to the amplifier based on the first signal to control the gain of the amplifier, wherein the processor determines a reference level value for the output signal by providing a calibration signal to the detector and setting the reference level value based on the first signal.

13. The circuit of Claim 12, wherein the detector is a power detector and the first signal is based on an average power level of the output signal.

14. The circuit of Claim 12, wherein the detector is a peak detector and the first signal is based on a peak amplitude level of the output signal.

15. The circuit of Claim 12, further comprising:

a digital-to-analog converter adapted to receive the calibration signal and provide the calibration signal as an analog signal to the detector; and

an analog-to-digital converter adapted to receive the first signal from the detector and provide the first signal as a digital signal to the processor.

16. The circuit of Claim 12, wherein the detector is a power detector comprising a low pass filter coupled to a correlator.

17. The circuit of Claim 12, wherein the fine gain control signal is set to minimize an absolute value of the first signal minus a reference value.

18. The circuit of Claim 12, wherein the amplifier comprises a gain stage, with the gain stage having a plurality of transconductance stages, wherein the fine gain control signal controls a bias current value for the transconductance stages and the coarse gain control signal controls which of the transconductance stages contribute to the gain of the amplifier.

19. The circuit of Claim 18, wherein the plurality of transconductance stages are associated with at least one load impedance.

20. The circuit of Claim 19, wherein the load impedance comprises a shunt, a shunt-series, a series-shunt, a series-shunt-series, a T-coil, a T-coil with a cross-coupled capacitor, or a series-T-coil.

21. A method of providing automatic gain control, the method comprising:

providing a gain to an input signal to provide an output signal;

monitoring a power level of the output signal; and

providing a coarse gain control and a fine gain control to control the gain based on the monitoring to maintain the output signal within a desired signal level range.

22. The method of Claim 21, wherein the monitoring estimates an average power level of the output signal.

23. The method of Claim 21, further comprising calibrating the monitoring to obtain a reference level value, with the desired signal level range based on the reference level value.

24. The method of Claim 21, wherein the gain is performed in stages, with the coarse gain control and the fine gain control controlling a gain of each of the stages.

25. A method of calibrating and monitoring an automatic gain control circuit, the method comprising:

providing a calibration signal whose signal level is estimated to provide a reference value;

setting a range for an output signal based on the reference value;

providing a gain to an input signal to provide the output signal;

monitoring an output signal level of the output signal; and

adjusting a coarse gain of the gain to maintain the output signal within the range.

26. The method of Claim 25, further comprising setting a fine gain of the gain to minimize an absolute value of the power level of the output signal minus the reference value.

27. The method of Claim 25, wherein the monitoring estimates an average power level of the output signal.

28. The method of Claim 25, wherein the monitoring estimates a peak amplitude signal level of the output signal.